

# ABSOLUTE CROSS SECTIONS FOR SINGLE ELECTRON CAPTURE IN ${}^3\text{He}^{2+}$ IMPACT ON $\text{CO}$

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Since X-ray emission from comets was for the first time observed in 1996<sup>1</sup>, a new motivation has appeared for measurements of absolute charge exchange cross sections for different ion/molecule pairs in the range of typical solar wind energies. These cross sections are needed, together with other laboratory data, for detailed modeling of the observed spectra. The need for explanation of recently observed EUV emission<sup>2</sup> from comet C/LINEAR 1999 S4 prompted us to measure single electron capture cross section in collisions of  $\text{He}^{2+}$  with  $\text{CO}$ .

We have measured absolute single electron capture cross sections in  ${}^3\text{He}^{2+}/\text{CO}$  for  ${}^3\text{He}^{2+}$  impact energies between 5 and 14 keV (velocities between 567 and 949 km/s). The experimental set-up is described in detail elsewhere<sup>3</sup> and it is mounted in one of beam-lines at JPL HCI facility<sup>4</sup>. Briefly, a narrow well-collimated ion beam (0.8 mm in diameter) is passed through a 60.8 mm long collision cell in which the target gas is introduced. The ion beam is subsequently analyzed by a simple retarding field. As the field stopping power is determined by  $\mathcal{E}/q$  ( $\mathcal{E}$  - electric field,  $q$  - ion charge), ions having captured one or more electrons can be easily separated by their final charge. Knowing the fraction of ions having a particular charge in the emerging ion beam, and the target density, absolute cross sections are readily determined.

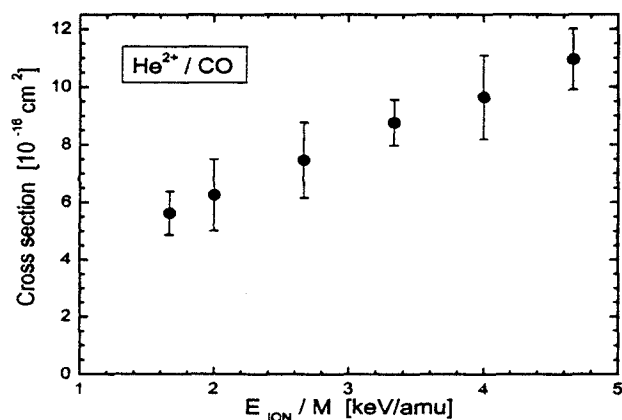


Figure 1. Cross sections for single electron capture in  ${}^3\text{He}^{2+}/\text{CO}$  collisions.

In Fig. 1 results of present measurements of single electron capture cross section are shown for the reduced energy range from 1.67 to 4.67 keV/amu. This energy range is of interest for cometary-data interpretation and fills the gap between available data at lower<sup>5</sup> and higher<sup>6</sup> energies.

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